

What Is Claimed Is:

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1. A metal-insulator-metal capacitor process, comprising:
forming a first dielectric layer on a substrate;
forming a first metal layer in the first dielectric layer;
forming a stop layer on the first dielectric layer;
forming a second dielectric layer on the stop layer;
forming a first patterned mask layer on the second dielectric layer;
performing an etching process, using the first patterned mask layer as an etching mask, so that a first opening and a second opening are formed in the second dielectric layer, thereby exposing portions of the stop layer above a first region and a second region of the first metal layer, respectively;
forming a second patterned mask layer on the second dielectric layer and a part of the stop layer;
performing a further etching process, using the second patterned mask layer as a further etching mask, to etch the stop layer below the second opening and to partially etch a third opening adjacent the second opening in the second dielectric layer without exposing the stop layer thereunder; and
forming a second metal layer over the substrate so as to fill the first, second and third openings;
wherein a metal-insulator-metal (MIM) capacitor is formed by the first region of the first metal layer, the stop layer and the filled first opening, and the filled second opening forms a via between the first and second metal layers, and the first and second metal layers include copper.
 2. The process according to claim 1, wherein the first dielectric layer includes a silicon oxide layer.

3. The process according to claim 1, wherein the stop layer includes a silicon nitride layer.
4. The process according to claim 1, wherein the second dielectric layer includes a silicon oxide layer.
5. The process according to claim 1, wherein the second metal layer is polished by chemical-mechanical polishing.
6. The process according to claim 1, wherein said forming the first metal layer includes polishing by chemical-mechanical polishing.
7. The process according to claim 1, wherein the first and second dielectric layers are thicker than the stop layer.
8. A metal-insulator-metal capacitor process, comprising:
 - forming a first dielectric layer on a substrate;
 - forming a first patterned masking layer over the substrate such that a portion of the first dielectric layer is exposed;
 - removing only a depth-wise portion the exposed portion of the first dielectric layer such that the substrate is not exposed;
 - filling the removed portions of the first dielectric layer with a copper or copper alloy thereby forming a first metal layer;
 - forming a stop layer on the first dielectric layer and the first metal layer;
 - forming a second dielectric layer on the stop layer;
 - forming a second patterned masking layer over the substrate such that a portion of the second dielectric layer is exposed;
 - removing the exposed portion of the second dielectric layer, so that a first opening and a second opening are formed in the second dielectric layer, thereby

exposing portions of the stop layer above a first region and a second region of the first metal layer, respectively;

forming a third patterned masking layer over the substrate such that a further portion of the second dielectric layer and a portion of the stop layer are exposed;

removing the exposed portions of the second dielectric layer and the stop layer, thereby exposing a portion of the second region of the first metal layer;

filling the first and the second openings with a copper or copper alloy thereby forming a second metal layer;

wherein a metal-insulator-metal (MIM) capacitor is formed by the first region of the first metal layer, the stop layer and the filled first opening, and the filled second opening forms a via between the first and second metal layers.

9. The process according to claim 8, wherein the first dielectric layer includes a silicon oxide layer.
10. The process according to claim 8, wherein the stop layer includes a silicon nitride layer.
11. The process according to claim 8, wherein the second dielectric layer includes a silicon oxide layer.
12. The process according to claim 8, wherein the second metal layer is polished by chemical-mechanical polishing.
13. The process according to claim 8, wherein said forming the first metal layer includes polishing by chemical-mechanical polishing.

14. The process according to claim 8, wherein the first and second dielectric layers are thicker than the stop layer.
15. A metal-insulator-metal (MIM) capacitor process, comprising:
 - forming a first metal layer on a substrate, wherein a portion of the first metal layer is utilized as the lower plate of the MIM capacitor;
 - forming an etch stop layer on the substrate and the first metal layer, wherein a portion of an etch stop layer is utilized as the insulator for the MIM capacitor; and
 - forming a second metal layer on the substrate and portion of an etch stop layer, wherein a portion of the second metal layer is utilized as the upper plate of the MIM capacitor;wherein the first and the second metal layers include copper or a copper alloy.
16. The process according to claim 15, wherein the stop layer includes a silicon nitride layer.
17. The process according to claim 15, wherein the second metal layer is polished by chemical-mechanical polishing.
18. The process according to claim 15, wherein the first metal layer is polishing by chemical-mechanical polishing.